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Desiderata and Suggestions.

BY PROFESSOR CAYLEY, *Cambridge, England.*

NO. 4.—MECHANICAL CONSTRUCTION OF CONFORMABLE FIGURES.

Is it possible to devise an apparatus for the mechanical construction of conformable figures; that is, figures which are similar as regards corresponding infinitesimal areas? The problem is to connect mechanically two points P_1 , P_2 in such wise that P_1 (1) shall have two degrees of freedom (or be capable of moving over a plane area) its position always determining that of P_2 : (2) that if P_1 , P_2 describe the infinitesimal lengths P_1Q_1 , P_2Q_2 , then the ratio of these lengths, and their mutual inclination, shall depend upon the position of P_1 , but be independent of the direction of P_1Q_1 : or what is the same thing, that if P_1 describe uniformly an indefinitely small circle, then P_2 shall also describe uniformly an indefinitely small circle, the ratio of the radii, and the relative position of the starting points in the two circles respectively, depending on the position of P_1 .

Of course a pentagraph is a solution, but the two figures are in this case similar; and this is not what is wanted. Any unadjustable apparatus would give one solution only: the complete solution would be by an apparatus containing, suppose, a flexible lamina, so that P_1 moving in a given right line, the path of P_2 could be made to be any given curve whatever.

CAMBRIDGE, *July 9th, 1879.*

